



**TO:** FCC

**FROM:** Amnon Beer

**Subject: Coordination Between Transmitters**

1) Our equipment complies with the FCC policy of non-coordination of hopping frequencies in the following fashion:

The system consists of Base Stations (RPC) and Subscriber Units (FAU). At a given "Base Site", multiple RPCs utilizing 60 degree sector beam antennas service the FAU's in their vicinity. The FAU in a given Sector is programmed to track only the RPC servicing its Sector and via TDD they share the same channel.

Upon initialization, each RPC randomly chooses a starting frequency (or phase) within the hopping sequence. This algorithm ensures that the frequency of a particular RPC transmission at a given instant is random with respect to the transmissions of other RPCs.

2) The design of the sequence is based on Reed - Solomon sequences. The generation of such sequences is based upon m-sequence shift registers theory, which is also used for pseudo random sequence generation (see Simon et. al. Spread Spectrum Techniques, section 5.8.3).

The actual sequence is composed of two such sequences, with 40 terms each. The frequency sequences  $f_n^{(1)}$  and  $f_n^{(2)}$  are given by:

$$f_n^{(i)} = (\mathbf{b} + \mathbf{a}^n) \bmod 41$$

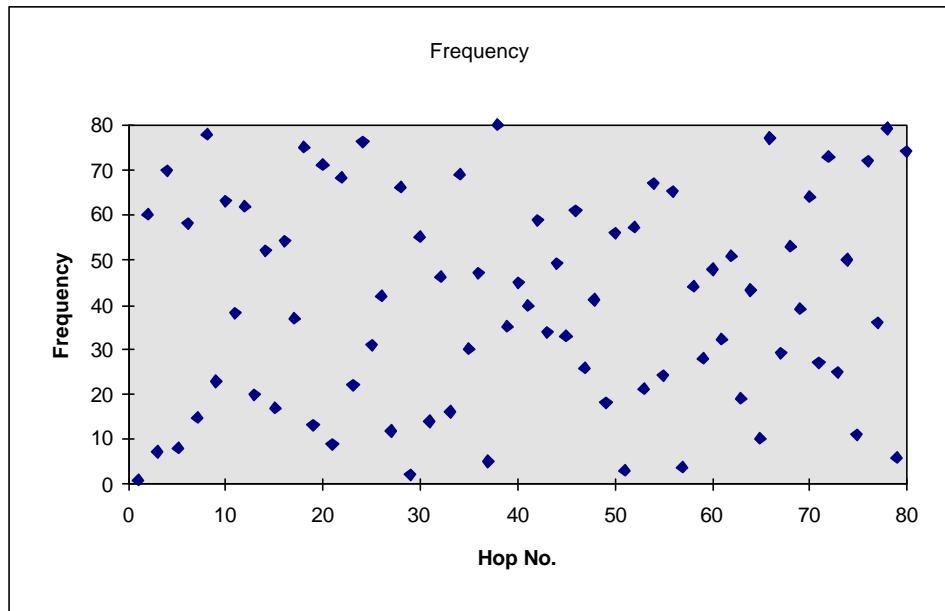
As an example, we can generate one sequence using  $\mathbf{a} = 7$ ,  $\mathbf{b} = 0$  and the other  $\mathbf{a} = 11$ ,  $\mathbf{b} = 20$ . The final sequence is finally formed by shifting the second sequence by 41 and then taking the terms alternatively from each sequence:

$$f_n = \{f_1^{(1)}, 41 + f_1^{(2)}, f_2^{(1)}, 41 + f_2^{(2)}, \dots\}$$

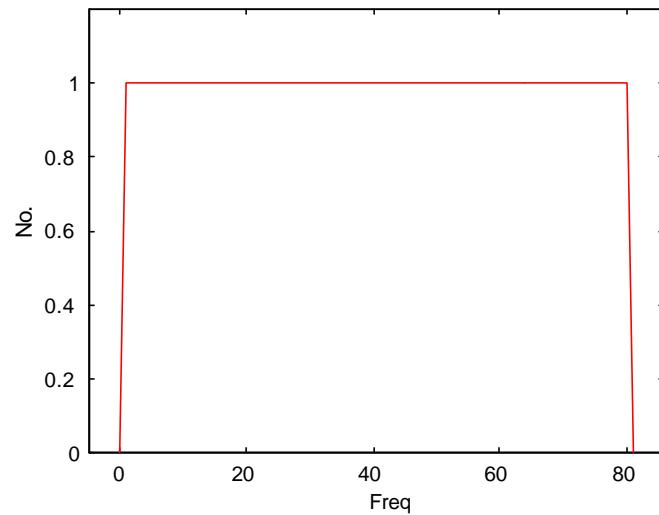
The resulting sequence is:

1	60	7	70	8	58	15	78	23	63	38	62	20	52	17	54	37	75
13	71	9	68	22	76	31	42	12	66	2	55	14	46	16	69	30	47
5	80	35	45	40	59	34	49	33	61	26	41	18	56	3	57	21	67
24	65	4	44	28	48	32	51	19	43	10	77	29	53	39	64	27	
73	25	50	11	72	36	79	6	74	1	60	7	.....					

This sequence is plotted in Fig. 1 below. The 80 point histogram given in Fig. 2 shows that it is evenly distributed. It is our understanding that the sequence described above meets the FCC Part 15 requirements for a frequency hopping system..



**Figure 1:** Frequency sequence



**Figure 2:** Frequency Distribution